The JUNCTION BOX

The junction box is used mainly as an interface between the main electro-optical cable and the floors' electro-optical cables. It provides:

- Power distribution
- Optical continuation
- Environmental monitoring

The power distribution

1. The NESTOR tower is supplied with 300V DC Volt. From the shore to the Junction Box (JB) we use one conductor (the copper tubing of the electro-optical cable that protects the optical fibers) to supply the power to the distribution rail inside the JB, through the main electro-optical connector (with one conductor and 18 optical connections). An electric filter is also used to isolate any interference collected from the cable or the power supply. As the second conductor of this power path we use the conductivity of the seawater; we have the so-called "sea return". A special electrode is connected to the JB power distribution with a deep-sea conducting cable.
2. The electric circuit is designed to use as the negative conductor the cooper tubing; in that case the JB sea-return electrode is negative in order to protect it from electrolysis.
3. The distribution rail consists of several "smart fuses". Each SMARTFUSE supply one floor electro-optical cable or external or internal instrumentation, through a secondary eletro-optical connector (with two conductors and two optical connections). The purpose of those fuses is to protect the power system in case of a instrument failure (by flooding or electric short) or cable cutting.
4. A "trip current" is calculated for each instrumentation (i.e. floor), depending of the current requirement of the particular instrumentation and with an appropriate margin. This Trip current is set (hardware) in the SMARTFUSE through which power is supplied to the corresponding instrumentation.
5. The logic of each SmartFuse (see drawing) is:
    a. There is an electronic circuit that measures the current passing through the SMARTFUSE. If the current is **less** than the particular trip current of the SMARTFUSE then a relay is switched on and power is provided to the Instrumentation.
    b. If the current is **more** than the particular trip current of the SMARTFUSE then the relay is switched off and **locked in the off state**. Thus NO power is provided to the Instrumentation.
    c. In case that instrumentation fails (any kind of short) while was operating then the SMARTFUSE will trip (condition b).
    d. A tripped SMARTFUSE will stay in the OFF state as long we keep main power on. When the main power is switched off the SMARTFUSE will reset.
    e. On resuppling main power to a previously tripped SMARTFUSE either a. condition will meet (the "short" is rectified) and power will be supplied to the particular Instrumentation or b. condition (permanent short).

Optical continuation

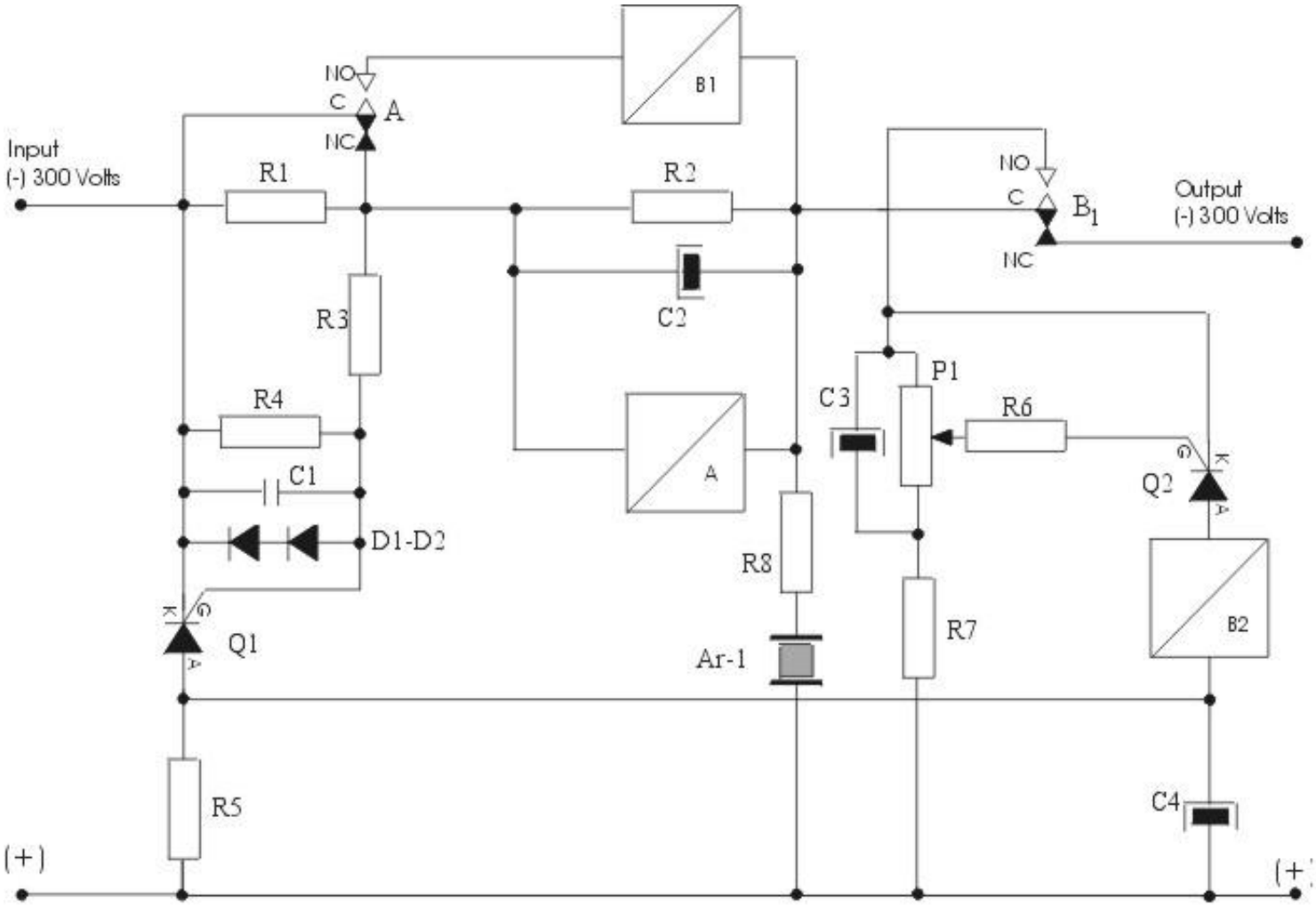
The optical fibers from the main electro-optical cable connector are connected correspondingly to the fibers of the secondary electro-optical connectors or other optical interfaces.

Environmental monitoring

We use two types of environmental monitoring

- Passive or Peripheral instrumentation outside the JB.
  The particular instrument (i.e. a current meter) is located outside the JB. A special cable is used to supply power to it (through a SMARTFUSE) and provide electric signal tranSmartFuseer to electric-to-optical interfaces located inside the JB.

- Active or monitoring inside the JB.
  a. As it was stated before we require a voltage of 300V to be available inside the JB. Because of the voltage drop along the 30km long main electro-optical cable we have to adjust the power supply in the shore to a higher voltage. Thus it is required to monitor continuously the voltage inside the JB.
     More over it is necessary to monitor other environmental conditions inside the JB as the temperature at selected points, the humidity, the presence of water (leak) etc.
  b. We use a small circuit to collect the above-described information, to multiplex the data and to send them optically to shore continusly through an optical fiber.



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